Lesson Title	Acids and Bases
Length of Lesson	1 day (50 minutes)
Created By	Hannah Brackin
Subject	Physical Science
Grade Level	7^{th} or 8^{th} grade science
State Standards	Eighth grade: 2b
DOK Level	DOK 2
DOK Application	Relate, distinguish, make observations, interpret
National Standards	5-8: B: Physical Science
Graduate Research Element	Acids and bases used regularly in laboratory. Lewis acids and bases are used as catalysts for many organic reactions performed.

Student Learning Goal:

State Standards Eighth Grade:
2(b) Predict the properties and interactions of given elements using the periodic table of the elements (DOK 2)

National Standards 5-8: B: Physical Science
Chemical elements do not break down during normal laboratory reactions involving such treatments as heating, exposure to electric current, or reaction with acids. There are more than 100 known elements that combine in a multitude of ways to produce compounds, which account for the living and nonliving substances that we encounter.

Materials Needed (supplies, hand-outs, resources):

Acids and bases power point, 72% dark chocolate candy bars (enough for each student to have a piece to eat), sour candy (enough for each student to have two pieces) warheads or lemon drops are suggested, Litmus paper, other pH paper/indicator, and a small beaker for each student.

Lesson Performance Task/Assessment:

The students will learn about acids and bases and how they are different from each other. This will include Litmus paper and pH indicators. The activity will give the student a chance to understand what an acid and base taste like in a safe way. Also they will get to see how to use pH paper and indicators that they just learned about.

Lesson Relevance to Performance Task and Students:

Students will be taught the properties of acids and bases. They will learn about the different indicators that can be used to test and interpret whether a substance is an acid or base. Once the material has been covered, the students will discover what an acid and a base taste like and have a chance to use some of the indicators that were just covered.

Anticipatory Set/Capture Interest:

Caught Red Handed Demo (See Teacher's Notes)

Guided Practice:

At the start of class, the teacher will ask students what they know about acids and bases. This will give the teacher an idea of what the students know and a chance to help with misconceptions. The teacher will then begin covering the properties of acids and bases.

Acids	**Bases**
Taste sour	Taste bitter
Compound with a pH below 7	Compounds with a pH above 7
Ionizes water to produce hydrogen ions H^+	Proton acceptor when dissolved in water, it will produce a hydroxide ion OH^-
Proton donor	Proton acceptor
Reacts with metals to produce hydrogen gas	Emulsify fats and oils
React with bases to form salts and water	Corrosive
Reacts with limestone to produce carbon dioxide	Slippery to the touch

List common examples of acids (hydrochloric acid, sulfuric acid, acetic acid, and citric acid) and bases (NaOH, NH_4OH, and soap) that the students would encounter.

Next, the teacher will go over the pH scale and how it works. Make sure to tell the students that pH stands for "Potential for Hydrogen". It would be beneficial to show the students scales that have examples of substances that they will recognize at every pH.

Finally, the teacher will cover litmus paper and how it is used. Acids turn blue to red and bases turn red to blue. The teacher can then cover other acid/base indicators that the student might see throughout the year. One such example would be phenolphthalein, which is colorless in acidic solution and pink in basic solution.

Once the material has been covered, the students will participate in an activity. Each student will be given a piece of 72% dark chocolate and two pieces of sour candy. Each

student will eat the chocolate and decide whether or not it tastes like an acid or a base. It should taste bitter like a base. Next, the students will be asked to eat one piece of the sour candy. They should identify whether it tastes like an acid or a base. It should taste sour like an acid. The students will then take the other piece of sour candy and place it in 10mL of water until the sour dust dissolves and then remove it from the solution. The students will then use two different types of pH paper to test the pH of the candy by dipping the paper into the water solution.

Independent Practice:

The students will have to taste chocolate and sour candy and identify whether they would be classified as an acid or base. They will then use the indicators and pH paper to test their hypothesis.

Remediation and/or Enrichment:

Remediation:

Individual IEP. After the students taste the candy, have the teacher test the indicators and show the students the results.

Enrichment:

The students could then test other common materials such as shampoo, food, and chemicals using the pH paper and indicators.

Check(s) for Understanding:

After showing the pH scale the students will be shown another that lists examples of substances at each pH level. Ask the students questions such as: Why is saliva (pH 6) slightly acidic? They should be able to reason that this is because it starts our digestion process.

What acid do we have in our stomach? Why does it not hurt or eat through our stomach lining?

After what we have learned about pH today, what do you think pH stands for? (potential of Hydrogen)

Closure:

The students will demonstrate how to use the pH indicators that they just learned about when preforming the test on the sour candy.

Possible Alternate Subject Integrations:

Biology: Buffers and physiological pH of the body.

Teacher Notes:

http://sites.google.com/site/chemistrydemos/7--chemcial-reaction/acid-base